Editorial: Why do you 'need-to-know': context-based education

Pilot, Albert; Bulte, Astrid M.W.

Editorial: Why do you 'need-to-know': Context-Based Education

Journal:	*International Journal of Science Education*
Manuscript ID:	TSED-2006-0053
Manuscript Type:	Special Issue Research Paper
Keywords:	chemistry education, curriculum
Keywords (user):	context-based

Special issue of IJSE on Context Based Chemistry Education

(Total of 8 papers, including the editorial)

Title Special Issue:

Challenges to Chemistry Education:

Reflecting on Context-Based Curriculum Design

Albert Pilot

Astrid M.W. Bulte

Centre for Science and Mathematics Education, Utrecht University,

Princetonplein 5, NL 3584 CC, Utrecht, The Netherlands

Correspondence to:

*Albert Pilot

a.pilot@ivlos.uu.nl

Phone: xx-31-30-2532150

Fax: xx-31-30-2537494

Editorial

Why do you 'need to know': Context-Based Education

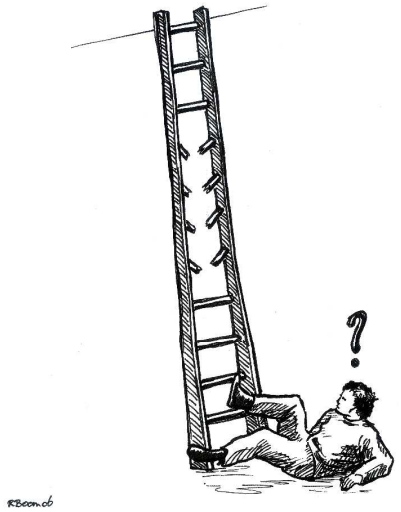
Albert Pilot*

Astrid M.W. Bulte

Centre for Science and Mathematics Education, Utrecht University,

Princetonplein 5, NL 3584 CC, Utrecht, The Netherlands

'Most of us who are scientists have enjoyed climbing this ladder as part of our education. We revel in the lofty view from the top. Unfortunately, many students do not see the connection between the successive rungs. They are not told and do not discover why or where they are climbing. Before long they develop vertigo. Often they jump or fall off the ladder before they reach the top. All they take from the experience is distaste for science'. (Schwartz, this issue)



Schwartz' metaphor provides us with a clear picture of curricular problems many of us wish to address when developing context-based science education. We acknowledge that students have to climb a ladder with too many rungs (curriculum-overload), which they do not organise into a coherent mental map of transferable knowledge. Furthermore, many of us understand that students do not see why they are climbing (relevance) or where their learning

leads to other than 'the next step in their education' as a default emphasis for science education.

In the first article of this Special Issue about Context-based Chemistry Education, Gilbert summarises these interrelated curriculum problems, and poses a series of challenges for context-based education. Gilbert derives criteria for the systematic development of context-based approaches that should both bring the learning of science closer to the lives and interests of students and show how the use of contexts would improve their interest in science and therefore enhance their understanding. This Special Issue with a description of five different context-based approaches includes a reflection on Context-based Chemistry Education. It evaluates the extent to which such approaches can address these curriculum challenges, applying Gilbert's criteria and models for the use of 'context'.

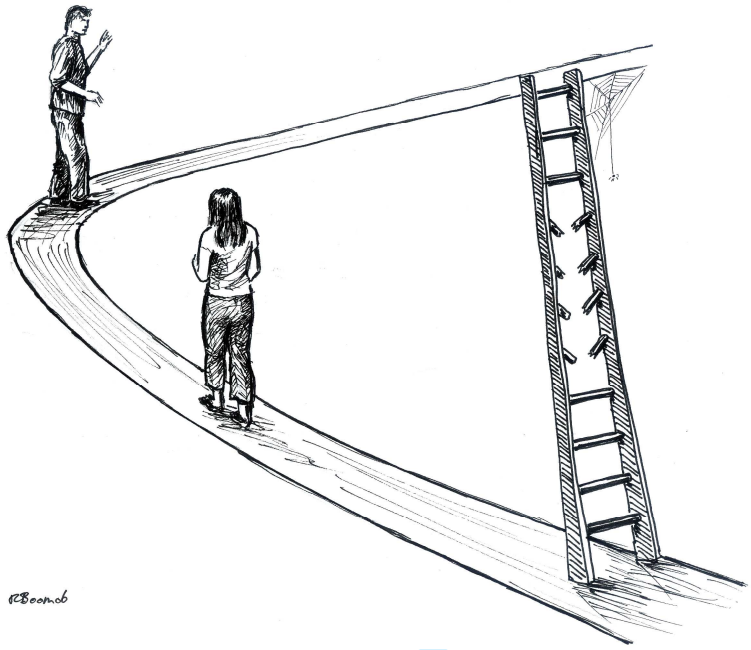
The need for this study of the development and understanding of the use of 'contexts', its successes and failures, has risen from the growing interest in context-based education. This interest is evident, both within the community of researchers and designers of chemistry curricula and within organisations preparing and deciding on governmental policy concerning chemistry education. For these developments, we can point to the five approaches described in this Special Issue: Chemistry in Context in the USA (Schwartz), Salters Advanced Chemistry in the UK (Bennett & Lubben), Industrial Chemistry in Israel (Hofstein & Kesner), Chemie im Kontext in Germany (Parchmann, Gräsel, Baer, Demuth, Ralle & the ChiK team), and a context-concept approach in the Netherlands (Bulte, Westbroek, De Jong & Pilot). This team of authors worked on this Special Issue of the International Journal of Science Education, emanating from a symposium at the ESERA conference in Barcelona 2005.

We found that the choice of contexts as starting point for the design of curricula and units within those curricula offers fruitful opportunities to avoid overload and to provide a representative curriculum. Selecting content on a need-to-know basis was used successfully to enable the development of coherent mental maps of knowledge in the domain of chemistry and to increase the relevance of the subject. However, very few explicit reports about the development of coherent mental maps of chemical knowledge are available. Almost none of the approaches adequately address the challenge of facilitating the 'transfer of learning'. The analysis also shows that explicit or implicit choices were made to broaden the aims of chemistry education using other than conventional emphases. We found a number of factors that were fostering or hindering the development and implementation process: the nature of the design and developmental process; the key characteristics of the framework of the course design; and some conditional circumstances during the development. These findings are related to the challenges Gilbert describes in the first paper. The key characteristics of the framework are also interpreted in terms of the 'models of context'. Furthermore, the necessary steps for the professional development of teachers, and the acceptance of context-based learning and innovative assessment systems by stakeholders are related to the criteria for successful context-based education.

The focus on Chemistry Education allowed for some comparison between the complex situation of different nations, educational systems and developments over a period of four decades. Despite this limitation, we have reasons to believe that our findings can be insightful for the broader field of Science Education. A systematic description of the developments is a first step towards the extraction of a theoretical knowledge base for context-based education. It aims to formulating new hypotheses and challenges for the agenda of future systematic curriculum development.

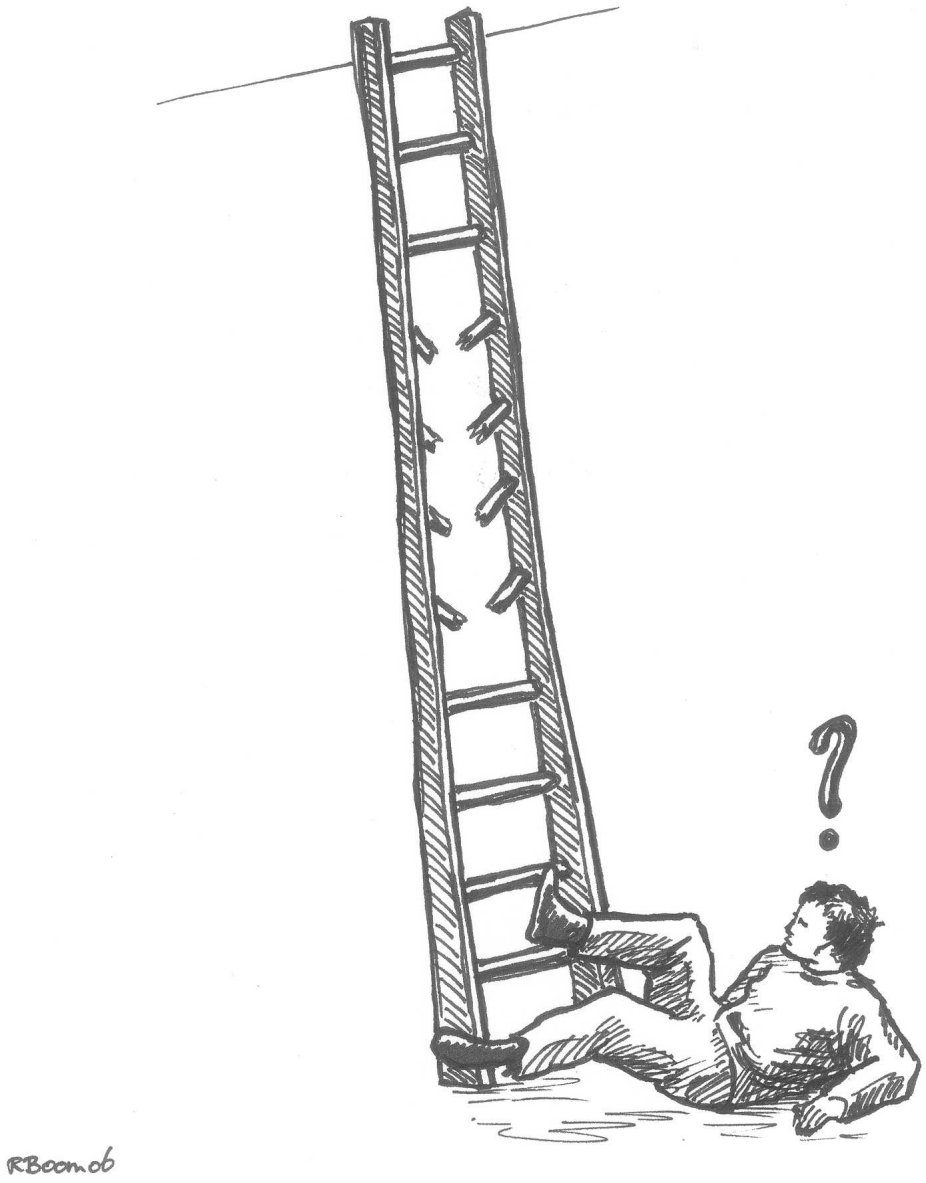
The papers are sequenced in the usual academic linear structure: first a theoretical basis about the nature of 'context', then the description of the five context-based approaches, and a final paper wrapping up the main findings of our study. As a reader however, you may apply a different style of reading and learning. Perhaps you acknowledge this usual linear structure, but you also may scan through the papers, picking up some findings here and there, wondering why some conclusions were drawn and going back to the theoretical aspects. We encourage you to find a pattern of interconnected links between theory and evidence about the learning and teaching of chemistry. We hope that by means of the final paper we can provide you with a 'need-to-know' about the successes, struggles, challenges and hard work of those who wish to motivate and educate the large numbers of young people, willingly or unwillingly in chemistry education. The authors feel a need for the further development of strategies to enable students to develop a coherent mental scheme of chemistry such that they can make connections to and between what is meaningful to them. Moreover, there is the issue of large scale acceptance of context-based education:

…. how does one overcome the activation-energy barriers to any educational reform, especially faculty obsession with covering the content rather than uncovering information for their students to discover? (Schwartz, this issue)

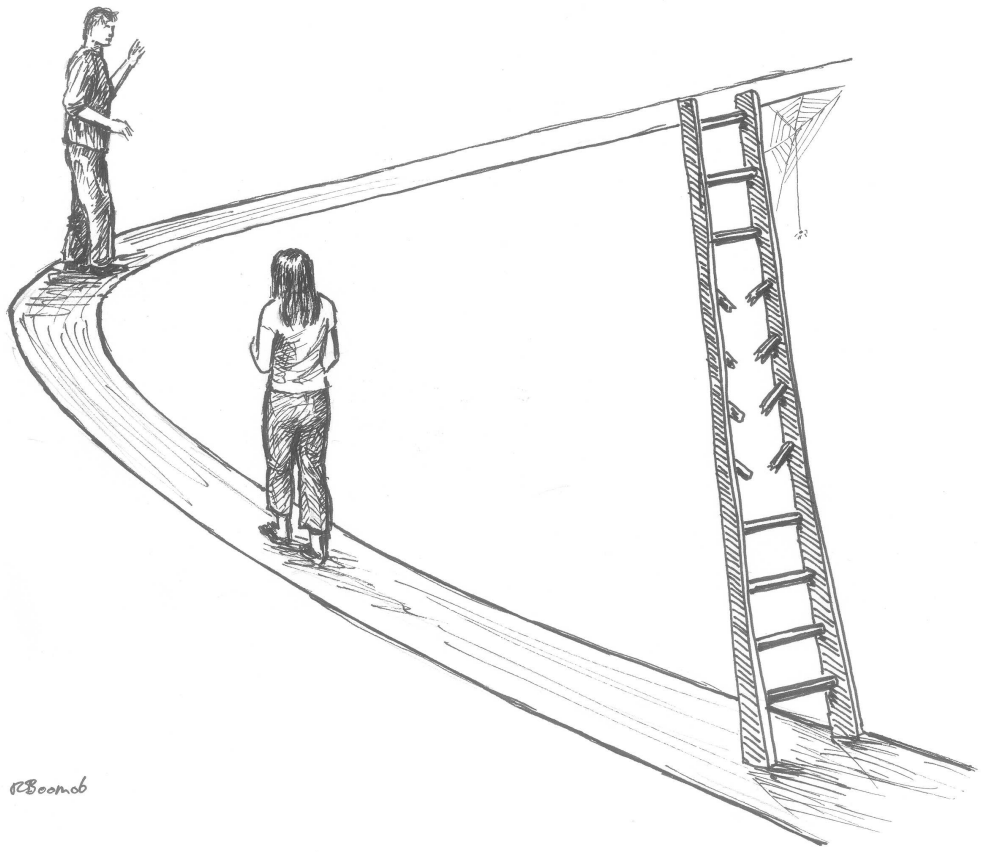


Reference

Schwartz, A. T. (this issue). Contextualised Chemistry Education: The American Experience. *International Journal of Science Education*.



no
500x636mm (72 x 72 DPI)



no
834x734mm (72 x 72 DPI)